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Research Output of Dibrugarh University: A Scientometric Analysis based on Scopus Database

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Abstract

Scopus is the largest bibliographic (abstract and citation) database of peer-reviewed literature launched in 2004 by Elsevier. In this study the research output of Dibrugarh University, a pioneer institute of higher education in North-East India is analysed based on data collected from Scopus database for thirty years i.e., from 1982 to 2020. A total of 1642 documents with the affiliation ID of Dibrugarh University. This study endeavours to visualize year wise distribution of publication and find out Annual Growth Rate (AGR), the most prolific author on the basis of H-index and number of publications, the top collaborating nations and affiliations with Dibrugarh University, the forms of documents of publication. The findings of the study reveal that highest number of publications 211 are in the current year of 2020 (12.85%) and least number of publications are in the year 1993 which is 1(0.061%). There is increase in the number of publications from 1.035% to 12.85%. Bhuyan, PK is the most productive author with 85 publications and 18 h-index. Bora, U is ranking first on the basis of h-index (20). Dibrugarh University has highest collaboration with Indian authors (685 publications) with a frequency of collaboration of 0.95, which is followed by Germany with 6 publications (0.0083) and Korea with 5 publications ((0.0069). Unlike any university Dibrugarh University has maximum number of self-collaborations with 2731 publications, this is followed by collaboration with Tezpur University with 118 publications. Journal articles are maximum in number (1389 of total records) and followed by conference paper (131 of total records).

Keywords: Dibrugarh University, Scientometrics, Annual Growth Rate (AGR), h-index, Collaboration, Journal Article.

1. INTRODUCTION

Research output enable academics to earn recognition in academic circle locally and internationally. In higher education, research output often served as a major role in attaining success in academics circles as it is related to promotion, tenure and salary. One of the strategies for determining research productivity is to access the quantity of publication which researcher communicated with primary or other sources. Research productivity and research activities are interrelated. Research involves collecting and analysing the data. Research productivity is the extent to which faculty engage in their own research and publish scientific articles in referred journals, conference proceedings, writing a book chapter, gathering and analysing original evidence, working with postgraduate students on dissertations and class projects, obtaining research grants, carrying out editorial duties, obtaining patents and licenses, writing monographs, developing experimental designs, producing works of an artistic or a creative nature engaging in public debates and commentaries (Creswell, 1986).

In 1969, two Russian scientists Vassily V. Nalimov and Z. M. Mulchenko coined the Russian term "Naukometriya" equivalent to 'scientometrics'. Tague-Sutcliffe (1992) defined "Scientometrics is the study of the quantitative aspects of science as a discipline or economic activity. It is part of the sociology of science and has application to science policy-making. It involves quantitative studies of scientific activities including, among others, publication, and so overlaps bibliometrics to some extent". The focus of scientometrics is the measurement of science and is therefore concerned with the growth, structure, inter-relationship, and productivity of scientific disciplines (Jeyasekar & Saravanan, 2015). There has been growing interest in mapping and visualization. Researchers began to focus on the structure of scientific literature in order to identify and visualize specialties, although they did not use the term "visualization" at that time. The co-word analysis and co-citation analysis are among the most fundamental techniques for science mapping.

2. DIBRUGARH UNIVERSITY

Dibrugarh University established in 1965 is one of the pioneer higher education institute in North -East India as a consequence upon Dibrugarh University Act, 1965, enacted by Assam Legislative Assembly. The university hosts 177 affiliated colleges and institutes that is spreading in nine districts of Assam. It has prolific and productive research output with brilliant academia. Dibrugarh University is a member of Association of Indian Universities and has various international collaboration.

3. SCOPUS DATABASE

It is the largest bibliographic database of peer-reviewed launched in 2004 by Elsevier. It covers approximately 36,377 titles from nearly 11,678 publishers, in broad subjects of life science, social science, physical science and medical science. It covers sources that include book, series journal, review, book chapter etc. All journals high quality standards are maintained. Metrics measurement include h-index, cite score, SJR, SNIP. This also incorporates patent database.

4. LITERATURE REVIEW

Sudhier and Kumar (2020) examined 25,132 biochemistry research contributions of Indian scientists covered in the Web of Science for a period of 10 years (2004-2013). It was found that the biochemistry research is gradually growing and average annual growth rate was 36.84 per cent. The solo research was not prevalent and team research is more in the Indian biochemistry research and 97.46 per cent publications were contributed by multi- authors. Veeramuthu (2020) measured the bioinformatics literature in scientometric research during 2007-2017, in this research analysed for various tools and techniques. Journal article occupied top position, Marterns, L has the first rank among the prolific authors and analysed top 10 institutions and titles. Jahina, Batcha and Ahmad (2020) presented the Lotka's law and pattern of author productivity of Brain Concussion. This research analysed various tools and techniques like Collaborative Index, Degree of collaboration, Co-authorship index and K-S Test. Chauhan (2019) has made a study on drone research at the global level, to quantify the research output based on scopus database for a period of 1968- 2017. Various bibliometric techniques were used to find out the growth rate of publications (annually 16.00 percent), citation analysis (cited rate 58.33 percent), authorship pattern and most productive countries were studied using various bibliometric methods. Malik, Aftab and Ali (2019) 3 presented a bibliometric examination of the crowd sourcing publications by using web of science for a period between 2008 and 2017. It was identified that 81 per cent of the total publications were articles and PLOS One was identified as the top journal in terms of total output and total citations.

Jahina. and Batcha. (2019) represented the bronchitis research in authorship pattern. This study used Pajak mapping tool for make the mapping degree of collaboration, geographical wise collaboration and mapping of co-authors. This study mainly discovered these types of collaboration. Pandey, Verma and Shukla (2019) used various scientometric indicators like year wise growth rate, more productive authors, source wise, subject wise and funding

agencies. Council of scientific and industrial agencies (CSIR) has the most popular funding agency in bioinformatics research in India. Chakrabooty. C was the most prolific author in bioinformatics and this research concluded that growth of bioinformatics is steadily increasing trend. Sab, Kumar and Biradar (2018) carried out the Medical research in India. This study focused for growth between India and International collaboration. Gopal and Sudhier (2017) conducted the study about collaborative research in bioinformatics in India, this study results found that the degree of collaboration was 0.91 and highest publications covered from collaboration publications.

Singh (2017) determined collaboration and authorship pattern of biotechnology research in India. Publication highly collaborated with United States and India and measured the activity index, gradually increased in this research. Gopal and Sudhier (2015) studied qualitatively the growth of bioinformatics research in India. This study found that degree of collaboration was 0.93 and most publications for journal article compared to other documents. Bradford's law of scattering not fit for this study. Dutta and Rath (2013) studied on the cosmology research in India. Sudhier and Dileep Kumar (2010) in their study determined the bibliometric characteristics of the biochemistry research in the University of Kerala, India, including subject wise break-up, bibliographic forms of cited documents, most cited journals, collaboration in authorship, etc. Molatudi, Neo and Pouris (2009) contributed the Bibliometrics tools and techniques, the 808 records for South Africa research during the period 16 years from 1990 to 2006 which was equivalent to world output 0.35%. Glanzel, Janssens and Thijs (2009) analysed the citation impact and publication activity in bioinformatics research, this analysis based on quantitative analysis. National publication activities and international collaboration analysed in this comparative study.

5. METHODOLOGY

The present study is designed to investigate the research output of Dibrugarh University. The study was undertaken based on the data downloaded from Scopus database, the largest database containing bibliographic and citation information. The data was retrieved on 18th December, 2020. The search string in the affiliation box used for the collection of data was ("Dibrugarh University") without limiting the data to be downloaded with any parameter. A total of 1642 records were found as per the searched strategy. These records were with full bibliographical details such as title, authors, source, year, affiliation, citation information etc. The data obtained was downloaded in CSV format from Scopus and final analysis were done applying the Scientometric parameters as per objectives of the study with MS-EXCEL. Visualization and

mapping of the results are done with the software VoS viewer, MS-EXCEL and Biblioshiny, through R-studio.

6. OBJECTIVES OF THE STUDY

- To visualize year wise distribution of publication and find out Annual Growth Rate (AGR).
- To find out the most prolific author on the basis of H-index and number of publications.
- To find out the top collaborating nations and affiliations with Dibrugarh University.
- To find out the forms of documents of publication.

7. DATA ANALYSIS AND INTERPRETATION

7.1 Year-wise distribution of publications

Table 1 and figure 1 below depicts the publications per year in the period taken for study (1982-2020) as per Scopus database for Dibrugarh University as affiliation. The annual growth rate (AGR) is calculated with the mathematical formula given by Kumar and Kaliyaperumal in 2015,

$$\text{AGR} = \frac{\boldsymbol{End\ Value - First\ Value}}{\boldsymbol{First\ Value}}\ X\ 100$$

On observation of analysed and tabulated data it is clear that maximum 211 number of publications are in the year 2020 which is 12.850% of the total. Initially, in 1982 the number of publications is 17, goes on decreasing till 1993 it reaches 1 and there is increase in number of publications from 1996 onwards to 2020. The second highest number of publications 168 are in the year 2019 which is 10.231% of the total. This is followed by 2016 which has 145 number of publications (8.83%). The graph in figure 2 clearly depicts the number of publications and annual growth rate of publications in the stipulated time period.

The average annual growth rate is positive which is 23.384.

Table 1: Year-wise distribution of Publication

Year	Number of Publications	% of 1642	AGR
1982	17	1.035323	0
1983	13	0.791717	-23.5294

1984	13	0.791717	0
1985	7	0.426309	-46.1538
1986	13	0.791717	85.71429
1987	9	0.548112	-30.7692
1988	6	0.365408	-33.3333
1989	5	0.304507	-16.6667
1990	6	0.365408	20
1991	5	0.304507	-16.6667
1992	5	0.304507	0
1993	1	0.060901	-80
1994	4	0.243605	300
1995	4	0.243605	0
1996	21	1.278928	425
1997	18	1.096224	-14.2857
1998	14	0.852619	-22.2222
1999	22	1.339829	57.14286
2000	15	0.91352	-31.8182
2001	20	1.218027	33.33333
2002	18	1.096224	-10
2003	22	1.339829	22.22222
2004	26	1.583435	18.18182
2005	20	1.218027	-23.0769
2006	17	1.035323	-15
2007	22	1.339829	29.41176
2008	33	2.009744	50
2009	28	1.705238	-15.1515
2010	51	3.105968	82.14286

2011	70	4.263094	37.2549
2012	68	4.141291	-2.85714
2013	63	3.836784	-7.35294
2014	120	7.308161	90.47619
2015	114	6.942753	-5
2016	145	8.830694	27.19298
2017	108	6.577345	-25.5172
2018	120	7.308161	11.11111
2019	168	10.23143	40
2020	211	12.85018	25.59524
	Total: 1642	**100%**	**Average Annual Growth Rate: 23.384**

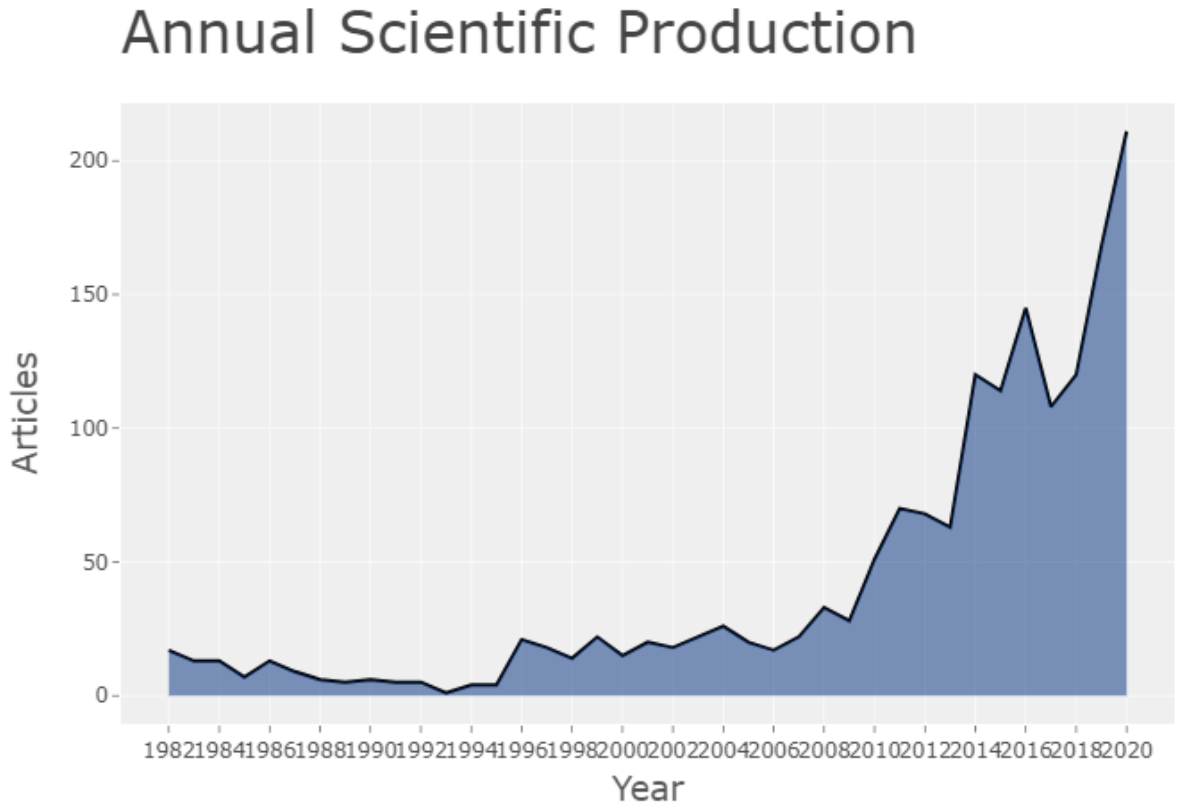


Figure 1: Annual Growth of Publication

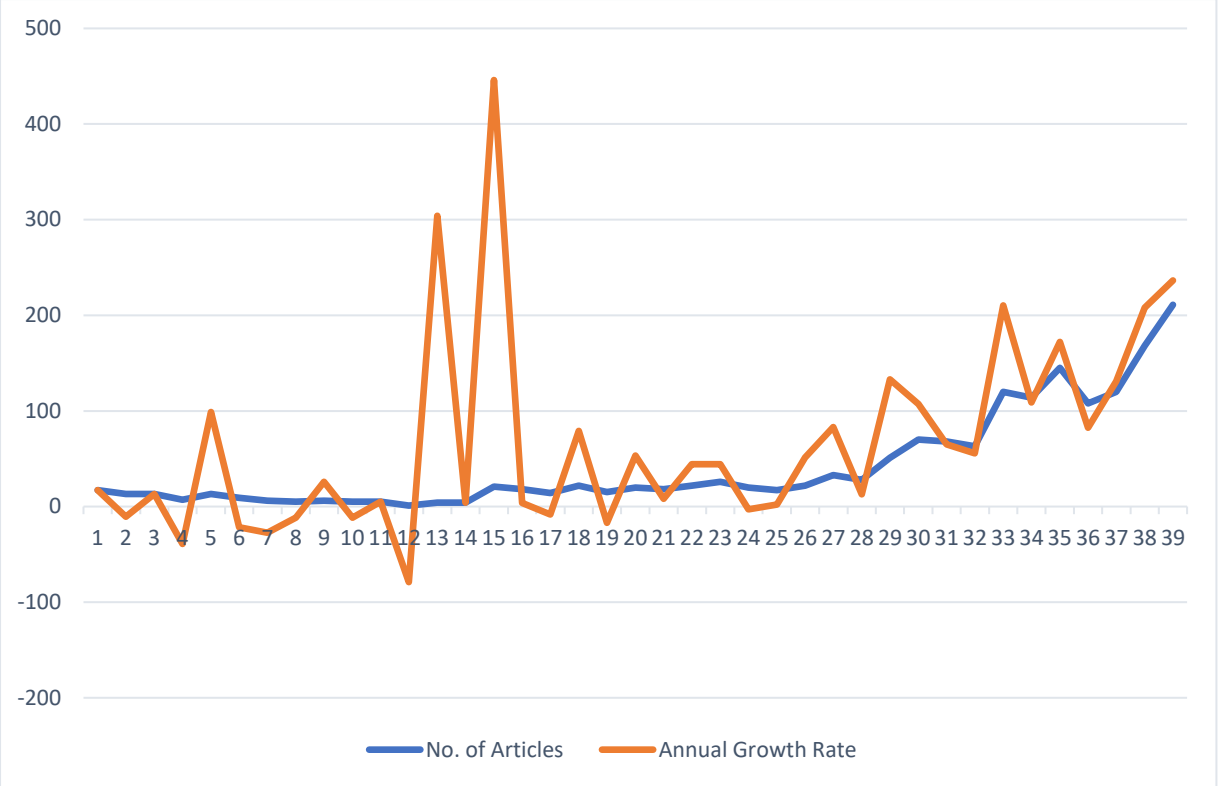


Figure 2: Number of Articles and Annual Growth Rate

7.2 Most Prolific Authors

Table 2, figure 3 and figure 4 below depicts the most prolific author in the period of study i.e., 1982 to 2020 on the basis of number of publications and h-index. As per the observation of the table it is clear that Bhuyan, PK has maximum number 85 of publications in his name, followed by Gogoi, PK with 79 publications, Dutta P with 73 publications, Das, NN with 61 publications with 52 publications. On the basis of h-index Bora, U has highest value of 20 followed by Bhuyan, PK with 18; Gogoi, PK with 17; Das, NN has 16; Sarma, D and Das, P has similar h-index of 14.

Table 2: Top 20 most productive author on the basis of number of publications and h-index

Name of Author	Number of Publications	H-index
BHUYAN PK	85	18
GOGOI PK	79	17
DUTTA P	73	10

DASS NN	61	16
SARMA D	52	14
YADAV RNS	52	11
CHAKRABORTY S	49	8
BORA U	46	20
BORKOTOKEY S	46	8
DAS P	42	14
BORAH D	39	9
BORAH G	37	10
BARUAH GD	31	6
DUTTA A	30	8
PATHAK B	30	9
CHETIA B	28	9
GOGOI P	28	4
HAZARIKA GC	27	5
SARMA JN	27	10
BAISHYA B	26	5

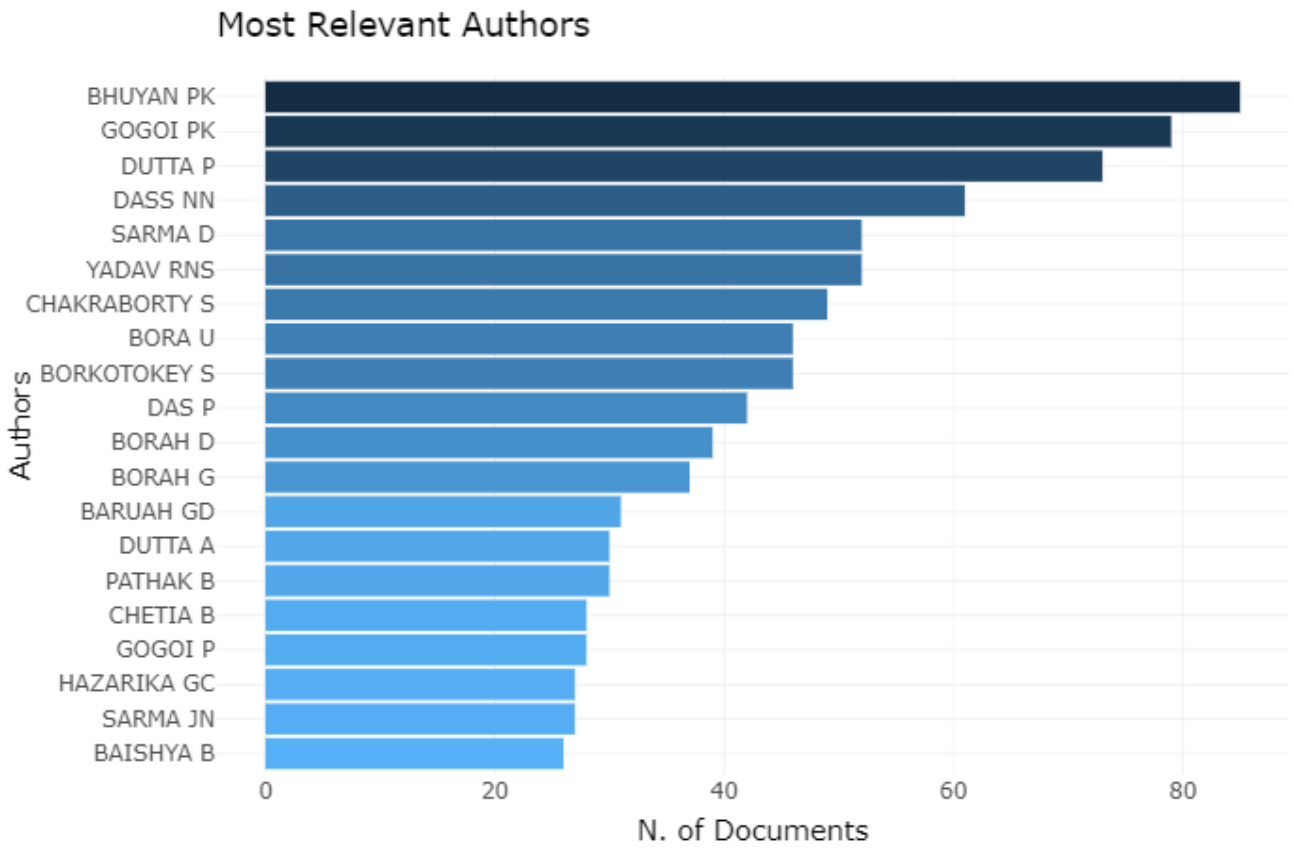


Figure 3: Top 20 Most prolific authors on the basis of Number of Publications

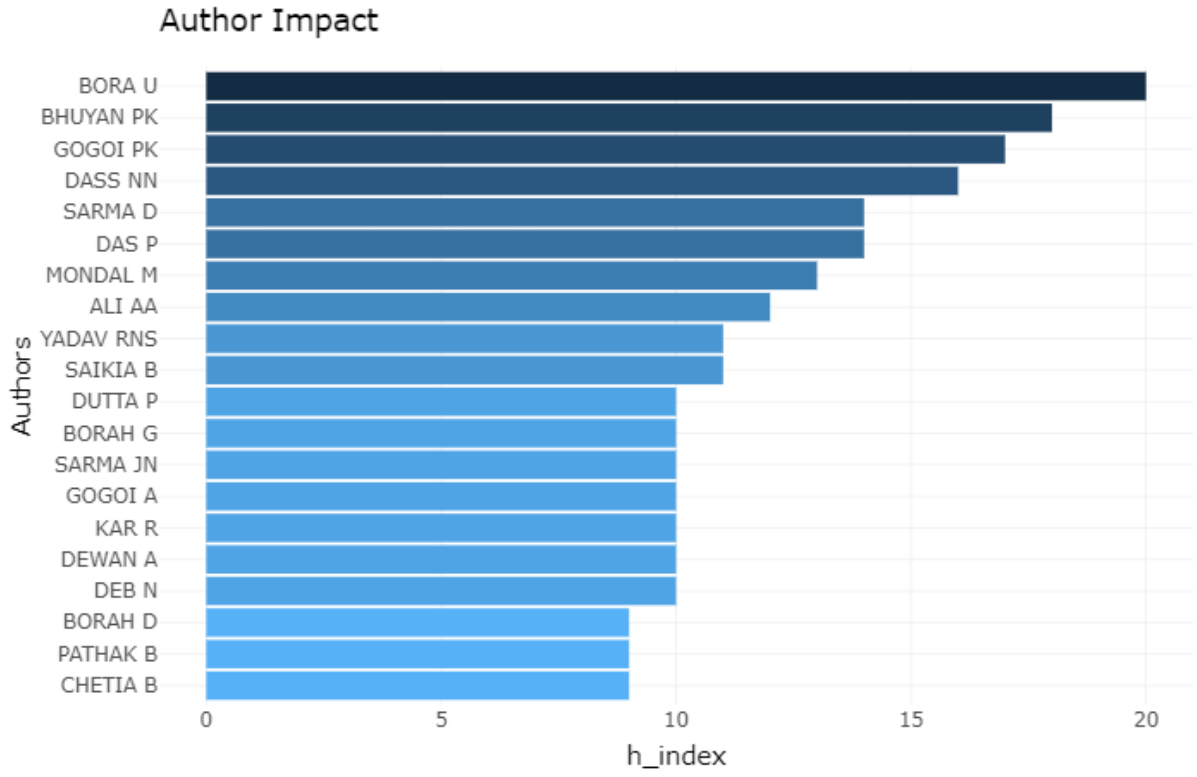


Figure 4: Top 20 most prolific authors on the basis of h-index.

7.3 Collaborative nations and affiliations with Dibrugarh Universities

7.3.1 Collaborative Nations

Table 3 and figure 5 below depicts the top 20 collaborating nations in the period of study from Dibrugarh University. The observation of table clearly reveals that maximum of collaborating is with our own nation India maximum of 685 with frequency of 0.95007 followed by collaboration with Germany with 6 articles, Korea with 5 articles, Japan with 4 articles, China and USA with 3 articles each.

Table 3: Top 20 collaborating nations with Dibrugarh University

Nations	**Articles**	**Frequency of Collaboration**
INDIA	685	0.95007
GERMANY	6	0.00832
KOREA	5	0.00693
JAPAN	4	0.00555
CHINA	3	0.00416
USA	3	0.00416
BRAZIL	2	0.00277
MALAYSIA	2	0.00277
PORTUGAL	2	0.00277
SLOVAKIA	2	0.00277
BANGLADESH	1	0.00139
FRANCE	1	0.00139
MALI	1	0.00139
NEPAL	1	0.00139
NIGER	1	0.00139
POLAND	1	0.00139
SINGAPORE	1	0.00139

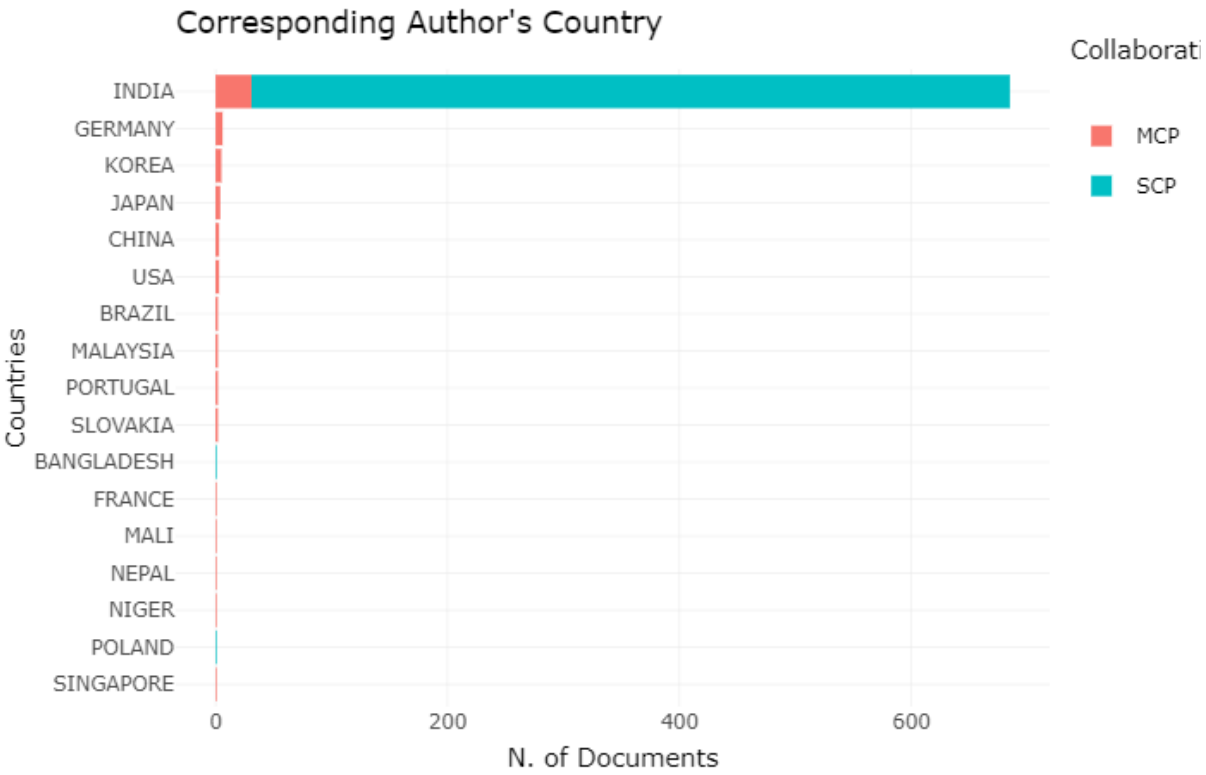


Figure 5: Graphical Visualization of top 20 collaborating nations with Dibrugarh University

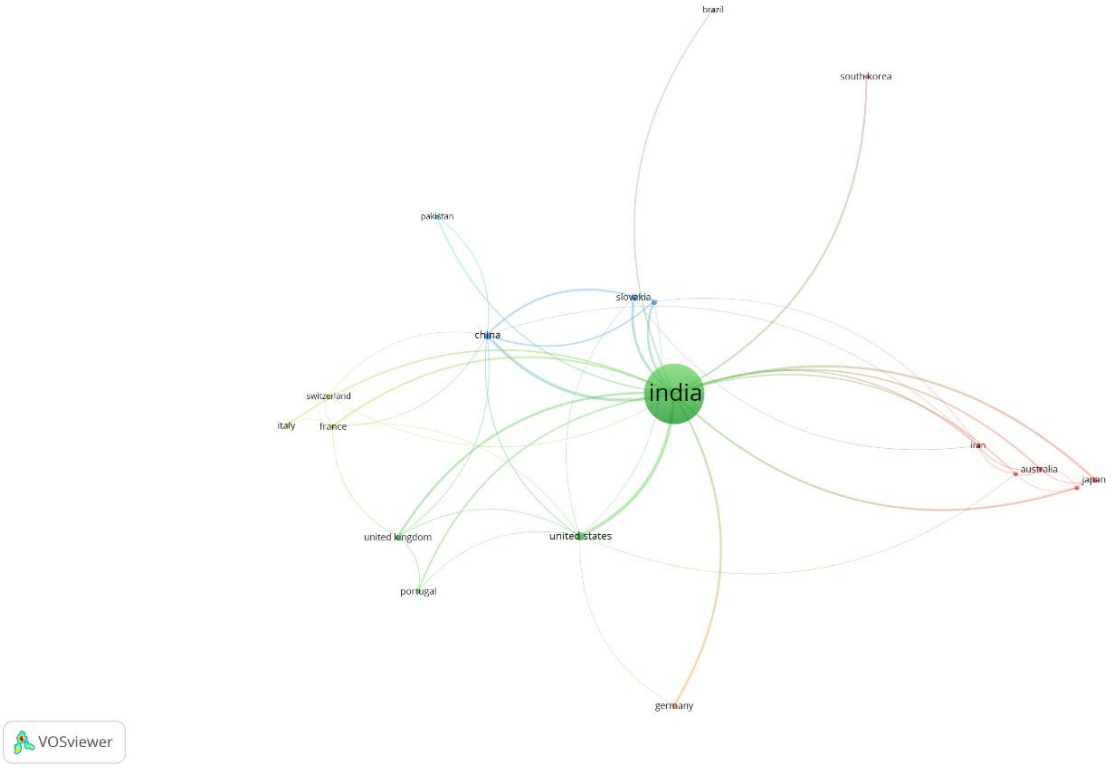


Figure 6: Mapping collaborating nations of Dibrugarh University

7.3.2 Collaborating Affiliations

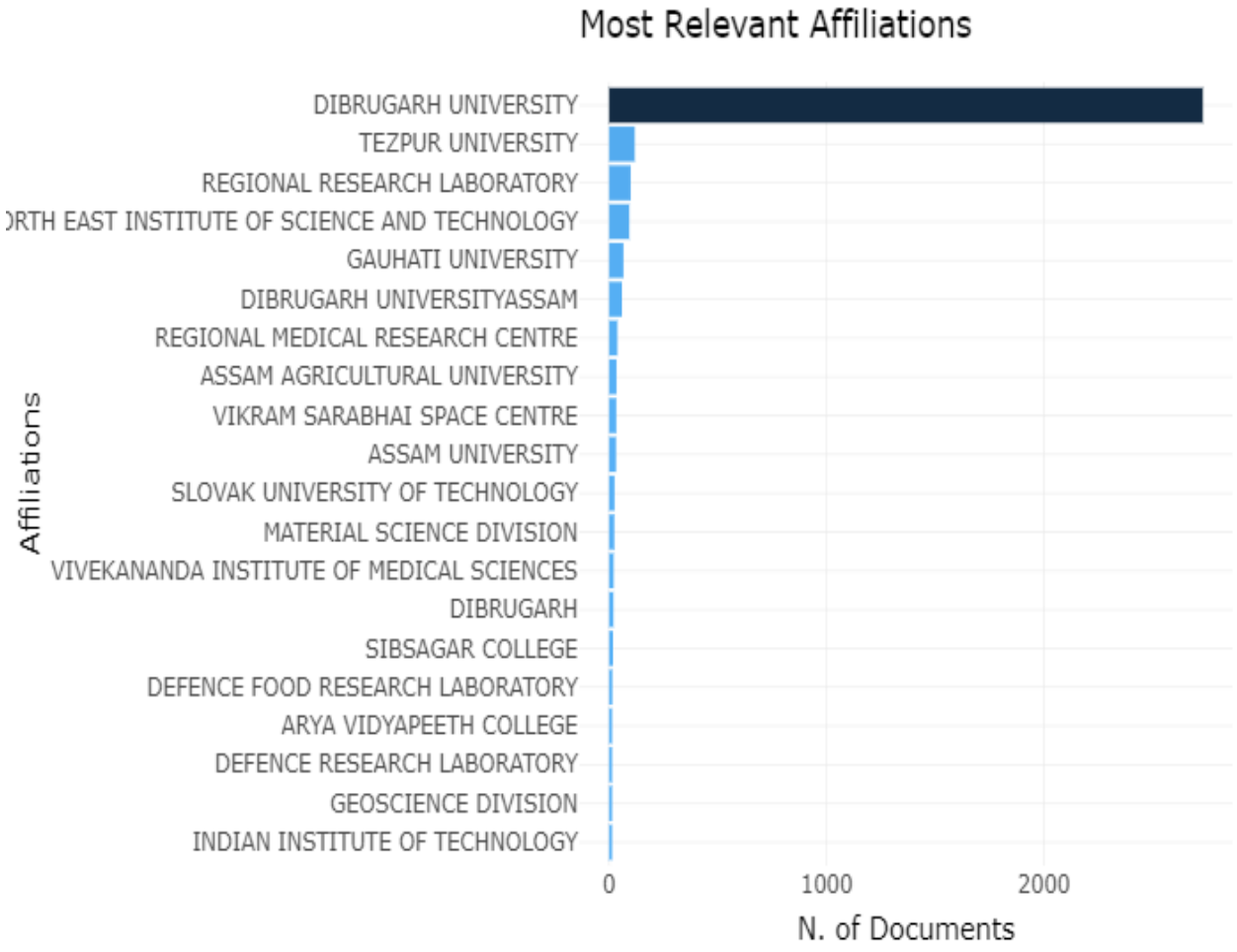
Table 4 and figure 7 demonstrates the top 20 collaborating affiliations with Dibrugarh University in the period of study. The observation of the table suggests that Dibrugarh University has maximum self-collaboration which is 2731 in number and this followed by collaboration with Tezpur University which is 118 in number, it has 99 collaborations with regional research laboratory, 93 with CSIR-NEIST, 66 with Gauhati University. The rest of the collaborating affiliations are tabulated below.

Table 4: Top 20 collaborating affiliations

Affiliations	**Number of Publications**
DIBRUGARH UNIVERSITY	2731
TEZPUR UNIVERSITY	118
REGIONAL RESEARCH LABORATORY	99
CSIR-NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY	93
GAUHATI UNIVERSITY	66
DIBRUGARH UNIVERSITYASSAM	59
REGIONAL MEDICAL RESEARCH CENTRE	38
ASSAM AGRICULTURAL UNIVERSITY	34
VIKRAM SARABHAI SPACE CENTRE	33
ASSAM UNIVERSITY	32
SLOVAK UNIVERSITY OF TECHNOLOGY	25
MATERIAL SCIENCE DIVISION	24

VIVEKANANDA INSTITUTE OF MEDICAL SCIENCES	21
DIBRUGARH	20
SIBSAGAR COLLEGE	18
DEFENCE FOOD RESEARCH LABORATORY	15
ARYA VIDYAPEETH COLLEGE	14
DEFENCE RESEARCH LABORATORY	14
GEOSCIENCE DIVISION	14
INDIAN INSTITUTE OF TECHNOLOGY	14

Figure 7: Top 20 collaborating affiliations



7.4 Forms of Document of publication

Table 5 below depicts the forms of documents of publication in the period of study. The observation of the table reveals that maximum number of publications are in article form which is 1389, this is followed by conference paper are 131, review 56, 37 number of book chapters, 5 erratum, 5 letter, 1 number of publications have no information available.

Table 5: Document form of published literature

Type of Document	No. of Records
Article	1389
Conference Paper	131
Review	56
Book Chapter	37
Note	17
Erratum	5
Letter	5
Editorial	1
No information available	1

8. CONCLUSION

The scientometric assessment of Research output of Dibrugarh University as per Scopus database from 1982 to 2020, being the peak time of acceleration of research shows that there is uneven growth of research publications, initially, in 1982 the number of publications is 17, goes on decreasing till 1993 it reaches 1 and there is increase in number of publications from 1996 onwards to 2020. The highest number of publications 211 are in the current year of 2020 (12.85%) and least number of publications are in the year 1993 which is 1(0.061%). There is increase in the number of publications from 1.035% to 12.85%. Bhuyan, PK is recorded to have 85 number of publications, being the most productive author with 18 as his h-index. Bora, U is ranking first with 20 as the maximum h-index to his/her name. Dibrugarh University has highest collaboration with Indian authors (685 publications) with a frequency of collaboration of 0.95, which is followed by Germany with 6 publications (0.0083) and Korea with 5 publications ((0.0069). Unlike any university Dibrugarh University has maximum number of

self-collaborations with 2731 publications, this is followed by collaboration with Tezpur University with 118 publications. As per forms of published literature is considered journal articles are maximum in number (1389 of total records) and followed by conference paper (131 of total records).

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